

Wind - Mill.

2 Sheets

Sheet 1.

Fig.1.

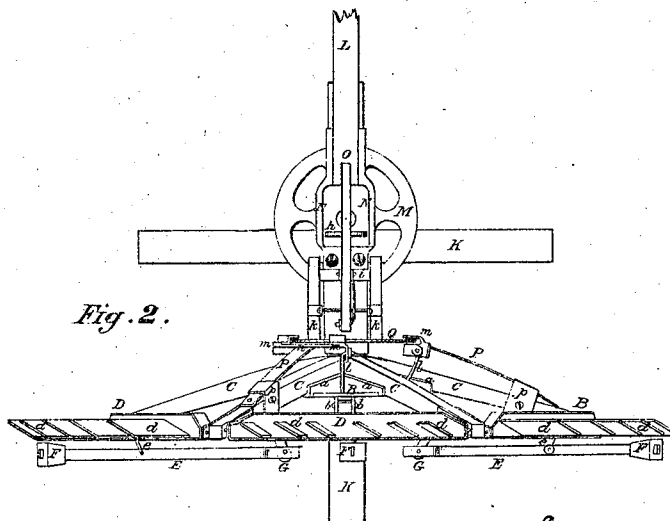


Fig. 2.

Andrieu Choffin
Ametinley

Witnesses

James Hall, Inventor
by Job Abbott, Attorney.

JAMES HALL. Wind-Mill.

118124

2 Sheets

Sheet 2

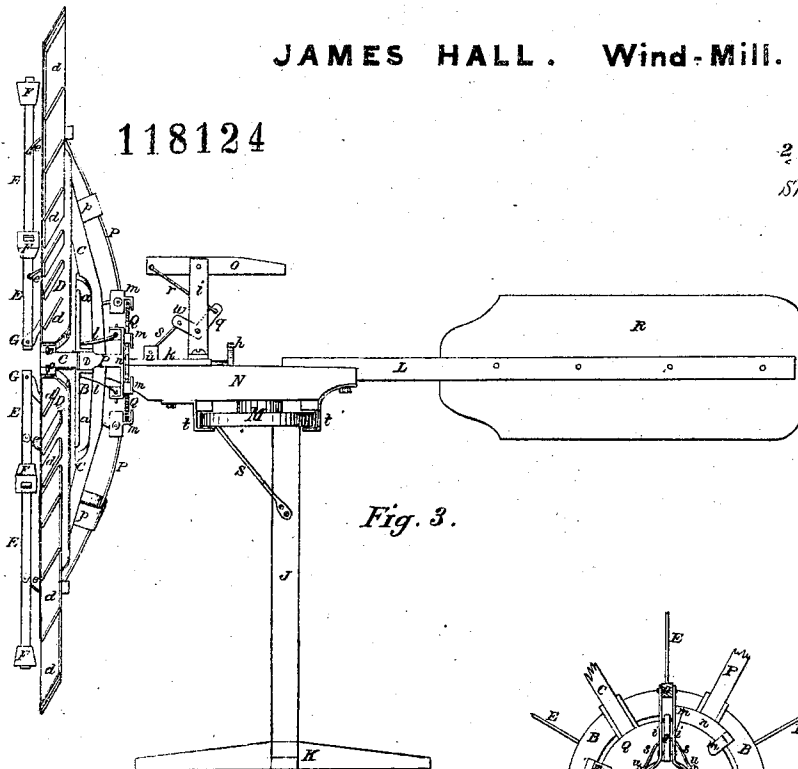


Fig. 3.

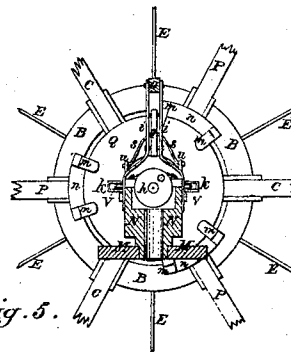


Fig. 5.

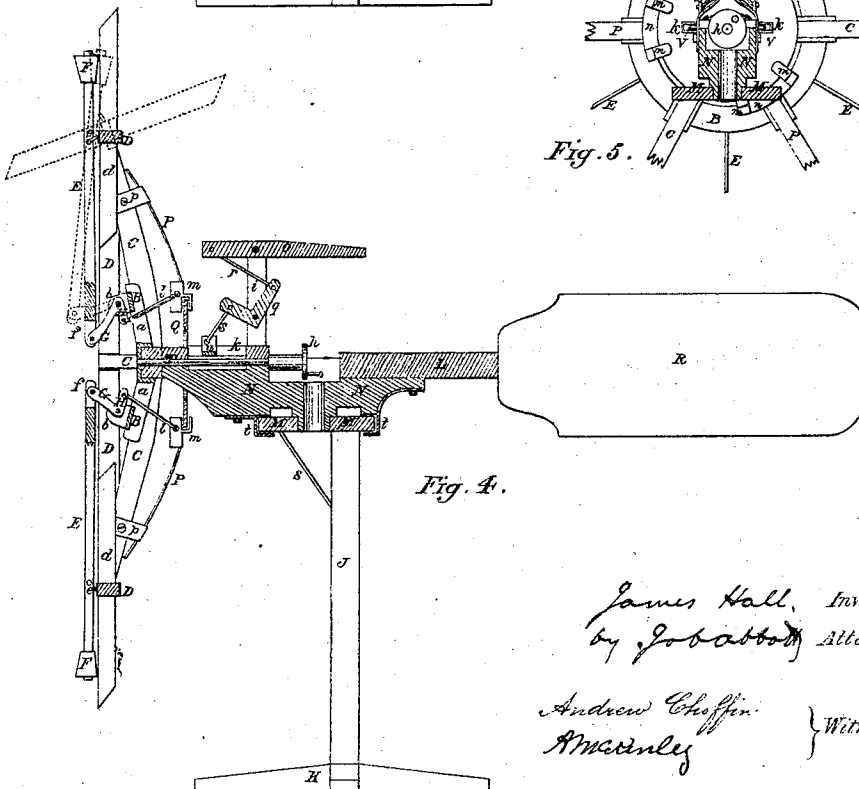


Fig. 4.

James Hall, Inventor
by Job Abbott, Attorney.

Andrew Choffin
Amesbury } Witnesses.

UNITED STATES PATENT OFFICE.

JAMES HALL, OF LIGONIER, INDIANA.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. 118,124, dated August 15, 1871.

To all whom it may concern:

Be it known that I, JAMES HALL, of Ligonier, in the county of Noble and State of Indiana, have invented certain new and useful Improvements in Windmills; and that the following is a full, clear, and exact specification thereof, which will enable others skilled in the art to make and use the said invention.

My invention relates to certain improvements in the mechanism for regulating the velocity and for unshipping the sails of a wind-wheel constructed with pivoted sails; and the first part of said invention consists in the combination of a pivoted wind-sail, with an adjusting-rod provided with a governor-weight, a pivoted bent lever, connecting-link, and sail-spring, the several parts being so arranged as that the spring acts through the connecting-link, pivoted bent lever, and adjusting-rod, to keep the sail turned up to the wind, while the governor-weight acts, by reason of centrifugal force, through the adjusting-rod, to turn the edge of the sail to the wind, and the sail-spring and weight being so adjusted as to hold the sail by their antagonistic action in the proper position to give the required velocity to the wheel, and to change the sail in the direction required to preserve this velocity under any change in the force of the wind, or in the power required to drive the machinery. The second part of said invention consists in the combination, with a wind-wheel having three or more pivoted sails each controlled by means of an adjusting-rod with governor-weight, pivoted bent lever, link and sail-spring, as herein described, of a circular head, arranged on slides on the revolving wheel-head, and connected with each of the several links of the sail-governing mechanism, by which means a simultaneous movement of all the sails is secured at all times, and the danger of having sails set at different angles at the same time is wholly prevented, thus obviating the difficulty of having a greater pressure brought on one side of the wheel than on the other, which would throw a severe racking strain on the wheel, and cause the wheel-shaft to bind in its journals, so as to make the wheel run heavily. The third part of said invention consists in the combination of a shipping-lever, rod, pivoted bent lever, and connecting-link with a sliding circular head, connected by links, pivoted bent levers, and adjusting-rods with each

of the pivoted sails of a wind-wheel, the whole being so arranged as that, by drawing down the shipping-lever, the several wind-sails may be all turned edgewise to the wind, so as to throw the wind-wheel out of service when required.

In the accompanying drawing, Figure 1 is a front view of a wind-wheel embodying my invention. Fig. 2 is a plan view of the same. Fig. 3 is a side view of the same. Fig. 4 is a transverse section of the same. Fig. 5 is a view of the rear face of the sliding circular head, and of the central part of the wheel, the revolving wheel-head being cut away through its axis.

The central part A of the wheel shown in drawing is made of cast-iron, and has the arms *a a*, to which the long arms C C of the wheel are secured, these arms *a a* being united by an outside ring, B, on which are cast the lugs *b b*, in which are secured the pivoted bent levers G H, which form part of the sail-governing mechanism. The sails D *d* D *d* consist of an axial piece, D, in which are inserted the thin sail-slats *d d*, and they are pivoted between the iron straps *c c* on the ends of the sail-arms C, as shown in Figs. 1 to 3, said arms being connected by the tie-rods I, near their outer ends, to give them a united action, and to prevent them from springing apart and dropping the sails. The standard-bolts *e* are secured in the axial sail-pieces D, and on the bent ends of these bolts are secured the adjusting-rods E, which have the heavy governor-weights F secured near their outer ends, and which are made with the forked ends *f f*, and are secured to the arms G of the pivoted bent levers G H, as shown in Fig. 4. The ends of the arms H of these bent levers are connected by links *l* with the head-pieces *m*, and these head-pieces are, for the sake of economy and convenience of construction, united in pairs by a cross-piece, *n*, as shown in Figs. 2, 3, and 5. On each alternate arm C are secured the sail-springs P, which rest on a wedge-shaped block at their rear ends, where they are held by a screw or bolt which is secured in the arm C, and by the stirrup-piece *p*, which is placed over them, and screwed to the arm C, as shown in Fig. 4. The lower and loose ends of these springs are secured to the cross-piece *n*, which unites the head-pieces *m* to which the links *l* are attached. The wheel-frame consists of the stationary circular bed-plate M, which is fastened to the tower or frame-

work K J S, on which the wheel is placed, and on this bed-plate is arranged the revolving-head N, which is held down by the lugs *t t*, which underlap the bed-plate. At one end of this revolving-head is secured the bar L, in which is the vane R, and in the other end is arranged the wheel-shaft T, on the outer end of which is fastened the wheel-head A, and on the inner end of which is the crank-disk *h*, or other device for transferring the power from the wheel-shaft. The circular head Q is secured to the slides *k k*, which slide on pins or lugs *v v* on the sides of the revolving head N, and on the head-pieces *m* are lugs which overlap the edge of the head Q, as shown in Figs. 2 and 5, so that the movement of this head, caused either by power applied to the slides *k k* or by pressure from one of the head-pieces *m*, produces a simultaneous movement of each of said head-pieces. The standard *i* is secured on the revolving head N, and has the shipping-lever O pivoted at its upper end, and this lever is connected at its outer end by a rod, *r*, with an arm of the bent lever *q*, which is pivoted in the standard *o* and is connected by a U-shaped link, *s*, with a lug, *u*, on each of the slides *k k*.

In the practical operation of this wind-wheel it is seen that the force of the spring P acts through the link *l* on the arm H, and draws the arm G toward the axis of the wheel, which draws the rod E in the same direction, and thus acts to keep the sails D *d* up to the wind in the position shown in drawing; but, as the wheel is turned rapidly by the wind, the centrifugal force of the weights F tends to pull the rods E away from the axis of the wheel, and thus turn the sails into the position indicated by dotted lines in Fig. 4; from which it is evident that, by sliding the weights F to the proper position on the rods E to give an amount of centrifugal force at the required velocity of the wheel sufficient to balance the tension of the springs P, the sails will be held at the angle required to produce that velocity, and it is also seen that when there is a decreased force of wind the springs P will act to turn the sails more to the wind, while, in case of an increased force of wind, the additional centrifugal force of the weights F will act to turn the edges of the sails more to the wind, thus preserving a uniform velocity of rotation under all circumstances. As each of the head-pieces *m* is connected with and forms a part of the sail-governing mechanism, it is seen that the common movement of these head-pieces, secured by the sliding circular head Q, as before shown, insures a common angle of deflection to the wind for each of the sails D *d*,

thus securing an equally-distributed pressure on the wheel and its shaft, as before stated. To throw all the sails up so that their edges stand to the wind, in order to prevent the wheel from turning when not in use, the operator draws down the long end of the lever O, which causes the arm *w* of the bent lever *q* to act as a toggle-lever in connection with the link *s* in pushing the slides *k k* and circular head Q toward the wheel-head A, thus affording a powerful toggle for pushing the circular head in said direction, by which the rods E are moved outward through the action of the head Q on the head-pieces *m*, links *l*, and bent levers G H, and the sails are turned up in the required direction. When this movement has been accomplished the link *s* and arm *w* will have been brought so near into line as to require but little or no power on the lever O to hold the parts in the desired position.

Having thus fully described my invention, what I claim herein as new, and desire to secure by Letters Patent, is—

1. The combination of the pivoted wind-sail D *d*, adjusting-rod E, governor-weight F, pivoted lever G H, link *l*, and sail-spring P, the several parts being arranged and operating substantially as herein specified.

2. The combination of the sail-spring P, combined head-pieces *m m m*, links *l l*, bent levers G H G H, adjusting-rods E E, governor-weights F F, and sails D *d* D *d*, the several parts being arranged as shown, so that one sail-spring serves as part of the governing mechanism for two sails, substantially as herein specified.

3. The combination of the circular head Q on the slides *k k* with the wind-wheel A C D, having three or more pivoted sails D *d*, each controlled by means of an adjusting-rod, governor-weight, pivoted bent lever, link, and sail-spring, the several parts being connected and arranged and operating substantially as and for the purpose herein specified.

4. The combination of the shipping-lever O, rod *r*, bent lever *q*, and link *s* with the slides *k k* and circular head Q, said head serving as a means of simultaneously operating the governing mechanism for the pivoted sails of a wind-wheel, and the several parts being arranged substantially as and for the purpose herein specified.

As evidence of the foregoing witness my hand this 16th day of June, A. D. 1871.

JAMES HALL.

Witnesses:

DAVID MORRELL, Jr.,
ISAAC PANEAKE.